

## A Serial Observation of Ovarian Fibroma in a Living Dairy Cow

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**Abstract :** Ovarian tumors in cows are uncommon and most are granulosa cell tumors. Bovine ovarian fibromas are extremely rare and tend to occur in older animals. This paper reports the case of a large ovarian mass found in a primiparous dairy cow which had shown no sign of cycling after calving. The mass continued to increase in size as detected during six-month serial observations by ultrasonography. An ovariectomy was subsequently performed and the growth was diagnosed as an ovarian fibroma by gross and microscopic examination. This case is the first report of an ovarian fibroma observed in a living dairy cow.

**Key words :** cow, fibroma, ovarian tumor, ovariectomy, ultrasonography.

### Introduction

Ovarian tumors are classified into three categories: tumors of the surface celomic epithelium, tumors of the gonadal stroma, and tumors of germ cells (11). Sex cord-stromal tumors which originate in theca cells, other stromal cells, granulosa cells, and testicular sex-cords (3) include granulosa cell tumors, luteomas, thecomas, fibromas, Sertoli cell tumors of the ovary, Leydig cell tumors, androblastomas, arrhenblastomas, and lipid cell tumors. These tumors account for 8% of ovarian cancers and approximately 7% of all malignant ovarian growths in humans (3). Reported ovarian tumors in the cow include granulosa cell tumors (2,4,8,10), hamartomas (1) and others (12,14). Ovarian tumors have been reported in pigs (6) and dogs (5,15) in Korea but there are no reported cases in live cows in this country. In the literature, we found one report of an ovarian fibroma examined at a slaughterhouse (7).

Our case involves a Holstein cow diagnosed with an ovarian fibroma following a history of prolonged postpartum anestrus. We report the diagnostic findings and gross morphological features following surgical removal (ovariectomy) and histopathologic examination.

### Case

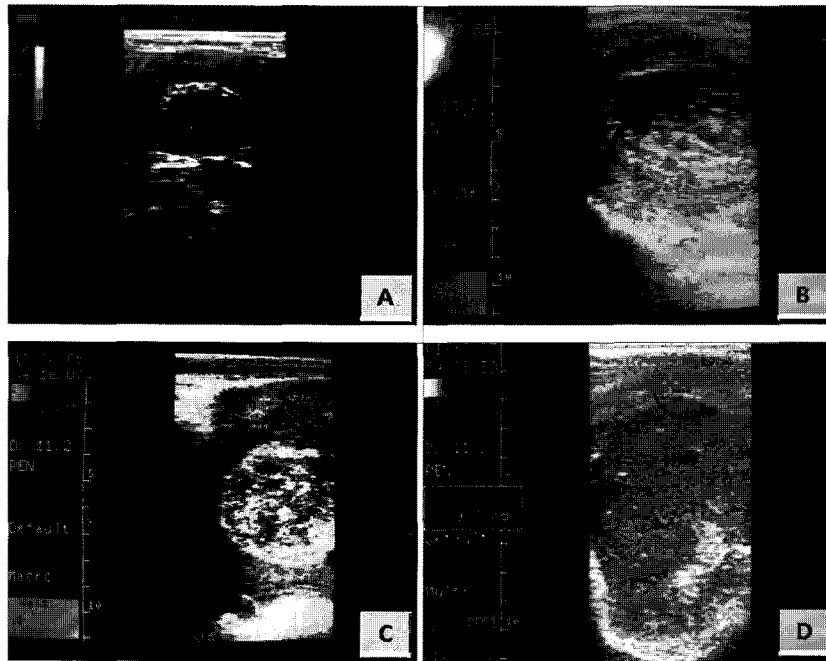
Transrectal palpation of the two-year-old primiparous Holstein cow with signs of anestrus revealed an enlarged left

ovary which was hard in consistency and measured six cm in size. The right ovary was normal in size. There was gradual enlargement of the left ovary over a six month period following the initial ultrasonographic examination (Figs 1A-1D). A unilateral ovariectomy was performed through a laparotomy incision of the left paralumbar fossa (Fig 2A) at six months after the initial diagnosis. The ovarian tumor was removed and remnants of the tumor were found to be adhered to adjacent tissues.

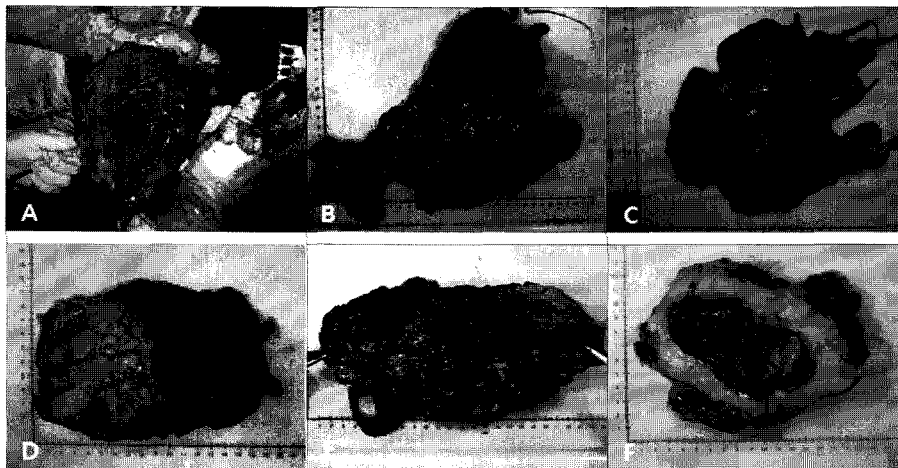
The tumor weighed 1.5 kg, measured 16 × 12 cm in dimension, and had a 30 × 26 cm circumference. It appeared as a rough lobulated capsule with several large veins on the surface of the mass (Figs 2B, 2C) and was composed of strong elastic white colored tissue with a rubber like consistency (Fig 2D). The inside of the tumor was empty as a result of necrosis. Purulent material had adhered to the walls (Figs 2E, 2F). For histopathological examination of tumor, the tumor contained spindle stromal cells from collagen (Figs 3A, 3B).

Ovarian specimens were fixed in 10% neutral buffered formalin and subsequently embedded in paraffin. Serial four-μm-thick sections of the ovarian mass were acquired from each paraffin block and stained with hematoxylin and eosin (H&E). Masson's trichrome staining was performed to confirm the fibrous tissue. Sections were deparaffinized and rehydrated in distilled water. Slides were treated in 56°C Bouin's fixative solution for 1 h, washed in running water and rinsed in distilled water after cooling at room temperature for 10 min. Slides were further treated for 10 min with Weigert iron hematoxylin stain, 17 min of Biebrich scarlet-acid fuchsin stain, and were differentiated in phosphomolybdic-phosphotungstic acid solution for 10 min. Fibrous tissue was stained

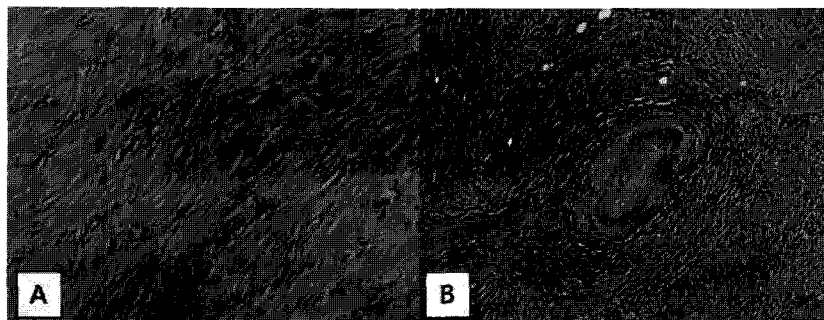
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**Fig 1.** Ultrasonographic images of abnormal left ovary which gradually enlarged during the six months following the initial examination: (A) June 29, 2006, (B) Oct 24, 2006, (C) Dec 20, 2006, (D) Jan 30, 2007.



**Fig 2.** Gross lesion of left ovary. (A) Unilateral ovariectomy through a laparotomy incision in the left paralumbar fossa. (B) Remnants of the mass were adhered to adjacent tissues. (C) Several large veins were identified on the surface of the mass (D) which was composed of white colored strong elastic tissue with a rubber like consistency. (E) The inside of the mass was empty as a result of necrosis (F). A transectional incision of the tumor revealed purulent material adhered to the wall.



**Fig 3.** Left ovary fibroma histopathology. (A) Abundant spindle-shaped cells and fibrocollagenous stroma detected with H &E stain ( $\times 100$ ). (B) Fibrous tissue identified by blue area with Masson's trichrome stain ( $\times 40$ ).

with aniline blue solution for 10 min. The slides were finally differentiated in 1% acetic water for 1 min, dehydrated, and cleared through graded ethyl alcohol.

## Discussion

Tumors originating from ovarian tissue can be divided into three broad categories: tumors of the surface celomic epithelium, tumors of the gonadal stroma, and tumors of germ cells (11). Gonadal stromal tumors are tumors of granulosa cells and their luteinized counterparts which are also called sex cord-stromal tumors since the granulosa cells may arise from the sex cords of the surface celomic epithelium or the mesonephric tubules (9). These tumors include granulosa cell tumors, luteomas, thecomas, Sertoli cell tumors of the ovary, Leydig cell tumors, androblastomas, arrhenoblastomas, and lipid cell tumors. The term "sex-cord-stromal" reflects the uncertainty of the embryologic and histogenic origin of cells in these tumors (9). Granulosa-theca cell tumors, the most common tumors in this group, are generally unilateral and are usually non-malignant in all species. Although they may be observed in young animals, their incidence increases with age. These tumors are interesting because of their ability to produce steroids.

Lagerlof and Boyd (7) reported that in 6286 bovine genital tracts examined, they discovered 13 ovarian tumors including three carcinomas, three granulosa cell tumors, a sarcoma, a fibrosarcoma, and five which were undiagnosed. Granulosa cell tumors are the most common in cattle and their incidence has been reported to be approximately 0.74% (13). A higher incidence of these neoplasms in dairy cows may be partially due to the more intense reproductive management practiced on most dairy operations compared to beef cattle operations. Cows with granulosa cell tumors may present with a variety of clinical signs ranging from anestrus, to nymphomania, and to male-like behavior. However, the cow in this case report was diagnosed with anestrus after not showing any signs of estrus for an extended period following parturition.

The few tumors reported in the literature (14) were described as firm, white-to-orange, and composed of streaming oval or spindle cells that resembled the cells of the theca interna. The finding of lipid in the cytoplasm permits differentiation from fibromas (11). In this case as in the literature, the tumor was very firm, elastic, white, and with a large oval shape which differed from the shape and morphology of granulosa cell tumors. Fibromas are rare solid ovarian tumors arising from the spindle stromal cells that form collagen (3). Fibromas in humans are most common during middle age and rare before the age of 30 (3). Fibromas in cows tend to occur in mature or older animals and may be associated with behavioral changes or changes in target tissues if the tumor is functional.

Unlike other sex cord-stromal tumors (2), fibromas are rarely associated with hormone production. In this case, the cow did not come into estrus for an extended period after calving. There were no concentration changes of progesterone and estrogen observed (data not shown).

In most cases, fibromas are benign and curable by surgical excision, however, there are very few reports of successful conception in cows after removal of these tumors. The surgical approach for removing the ovary depends on the size and location of the ovary and the demeanor of the cow. In this case the ovarian tumor was removed by laparotomy in the left paralumbar fossa and confirmed as a fibroma based on gross lesions and histological findings.

This case suggests that ovarian fibromas in young dairy cows tend to increase over an extended time period.

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## 살아 있는 젖소에서 연속 관찰한 난소섬유종

허태영 · 강석진 · 정영훈 · 최창용 · 손동수 · 김의형 · 박성재 · 서국현\* · 강태영\*\*<sup>1</sup>

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**요 약** : 소에서의 난소종양은 흔치 않으며 발견되는 대부분의 난소종양은 과립막세포종양이다. 소의 난소섬유종은 매우 드물며 노령의 동물에서 발병하는 경향이 있다. 본 증례에서는 분만 후 발정징후를 나타내지 않은 초산 젖소에서 발견된 큰 난소종괴를 연속적으로 관찰한 결과이다. 종괴를 초음파로 6개월 동안 연속적으로 관찰한 결과 크기가 지속적으로 증가하였다. 난소절제술을 시행하여 육안검사 및 조직학적 검사소견으로 난소섬유종으로 진단하였다. 본 증례는 살아있는 젖소에서 연속적인 관찰과 진단을 내린 난소섬유종의 첫 사례이다.

**주요어** : 소, 섬유종, 난소종양, 난소절제술, 초음파